WHAT IS CLAIMED IS:

1. A piezoelectric resonator comprising:

a substrate having one of an opening and a concavity;

a vibrating section in which at least one pair of an upper electrode and a lower electrode oppose each other so as to sandwich an upper surface and a lower surface of a thin-film section having at least one layer of a piezoelectric thin film, the vibrating section being disposed over the one of the opening and the concavity; and

a heat dissipating film located over at least one of the upper electrode and the thin-film section so as not to cover the vibrating section.

2. A piezoelectric resonator according to Claim 1, wherein the heat dissipating film has a thermal conductivity of approximately 150 W/(m·K) or higher.

3. A piezoelectric resonator according to Claim 2, wherein the heat dissipating film includes an insulating material selected from the group consisting of silicon, aluminum nitride, and diamond.

4. A piezoelectric resonator according to Claim 2, wherein the heat dissipating film includes a metal selected from the group consisting of copper, aluminum, gold, and silver, or an alloy mainly composed of copper, aluminum, gold, or silver.

5. A piezoelectric resonator according to Claim 1, wherein a distance between the heat dissipating film and the vibrating section is approximately one half of a vibrating wavelength of the vibrating section.

6. A piezoelectric resonator according to Claim 1, wherein the one of the opening and the concavity is entirely covered by the heat dissipating film except over the vibrating section.

7. A piezoelectric resonator according to Claim 5, wherein a peripheral region of the one of the opening and the concavity is covered by the heat dissipating film.

8. A piezoelectric resonator according to Claim 1, wherein the vibrating section has a polygonal shape with edges of different lengths as viewed in a thickness direction, and at least a longest edge of the vibrating section extends along an edge of the one of the opening and the concavity.

9. A piezoelectric resonator according to Claim 8, wherein the longest edge of the vibrating section has a length that is longer than a distance between the one of the opening and the concavity and a point of the vibrating section that is most distant from the edge of the one of the opening and the concavity.

10. A piezoelectric resonator according to Claim 8, wherein a distance between the longest edge of the vibrating section and the edge of the one of the opening and the concavity is approximately one half of a vibrating wavelength of the vibrating section.

11. A piezoelectric resonator according to Claim 10, wherein all the edges of the vibrating section extend along edges of the one of the opening and the concavity, and distances between all the edges of the vibrating section and the associated edges of the one of the opening and the concavity are approximately one half of the vibrating wavelength of the vibrating section.

12. A piezoelectric resonator according to Claim 8, wherein a sum W of all edges of the vibrating section, extending along edges of the one of the opening and the concavity, and a distance L between the opening or the concavity and a point of the vibrating section that is most distant from an edge of the one of the opening and the concavity satisfies a relationship of $L/W \leq 0.8$.

13. A piezoelectric resonator according to Claim 8, wherein the vibrating section as viewed in the thickness direction is at least as long as approximately twenty times a

vibrating wavelength of the vibrating section in a lengthwise direction thereof, and is not wider than approximately five times the vibrating wavelength in a width direction thereof.

14. A piezoelectric resonator according to Claim 8, wherein the vibrating section as viewed in the thickness direction has a shape of an isosceles triangle.

15. A piezoelectric resonator comprising:

a substrate having one of an opening and a concavity; and

a vibrating section in which at least one pair of an upper electrode and a lower electrode oppose each other so as to sandwich an upper surface and a lower surface of a thin-film section having at least one layer of a piezoelectric thin film, the vibrating section being disposed over the one of the opening and the concavity;

wherein the vibrating section as viewed in a thickness direction has a polygonal shape with edges of different lengths, and at least a longest edge of the vibrating section extends along an edge of the one of the opening and the concavity.

16. A piezoelectric resonator according to Claim 15, wherein the longest edge of the vibrating section has a length that is longer than a distance between the one of the opening and the concavity and a point of the vibrating section that is most distant from the edge of the one of the opening and the concavity.

17. A piezoelectric resonator according to Claim 15, wherein a distance between the longest edge of the vibrating section and the edge of the one of the opening and the concavity is approximately one half of a vibrating wavelength of the vibrating section.

18. A piezoelectric resonator according to Claim 17, wherein all the edges of the vibrating section extend along edges of the one of the opening and the concavity, and distances between all the edges of the vibrating section and the associated edges of the one of the opening and the concavity are approximately one half of the vibrating wavelength of the vibrating section.

19. A piezoelectric resonator according to Claim 15, wherein a sum W of all edges of the vibrating section, extending along edges of the one of the opening and the concavity, and a distance L between the one of the opening and the concavity and a point of the vibrating section that is most distant from an edge of the opening or the concavity satisfies a relationship of $L/W \leq 0.8$.

20. A piezoelectric resonator according to Claim 15, wherein the vibrating section as viewed in the thickness direction is at least as long as than approximately twenty times a vibrating wavelength of the vibrating section in a lengthwise direction thereof, and is not wider than approximately five times the vibrating wavelength in a width direction thereof.

21. A piezoelectric resonator according to Claim 15, wherein the vibrating section as viewed in the thickness direction has a shape of an isosceles triangle.

22. A piezoelectric resonator according to Claim 1, wherein the piezoelectric thin film is composed mainly of zinc oxide or aluminum nitride.

23. A piezoelectric filter comprising a piezoelectric resonator according to Claim 1.

24. A piezoelectric filter comprising a plurality of piezoelectric resonators according to Claim 1, the piezoelectric resonators being arranged in a ladder configuration.

25. A duplexer comprising a piezoelectric resonator according to Claim 1.

26. A communication device comprising a piezoelectric resonator according to Claim 1.

27. A piezoelectric filter comprising a piezoelectric resonator according to Claim 15.

28. A piezoelectric filter comprising a plurality of piezoelectric resonators according to Claim 15, the piezoelectric resonators being arranged in a ladder configuration.

29. A duplexer comprising a piezoelectric resonator according to Claim 15.

30. A communication device comprising a piezoelectric resonator according to Claim 15.